

Pierce County Shellfish Partners

2020 Strategic Plan

November 8, 2013



The development of this plan was funded through an Environmental Protection Agency National Estuary Program Competitive Award Administered by the Washington State Department of Health (C16903)

Table of Contents

Partner Organizations	3
Introduction.....	4
Vision and Mission	5
Goals	6
Assumptions	7
Pierce County Shellfish Areas Map	8
Goal 1: Prevent Sources of Water Pollution.....	9
Objective 1.1	9
Objective 1.2	10
Objective 1.3	11
Objective 1.4	12
Objective 1.5	13
Objective 1.6	14
Objective 1.7	15
Goal 2: Identify Sources of Water Pollution.....	16
Objective 2.1	16
Objective 2.2	17
Objective 2.3	17
Objective 2.4	18
Objective 2.5	19
Objective 2.6	20
Goal 3: Correct Sources of Water Pollution	21
Objective 3.1	21
Objective 3.2	21
Objective 3.3	22
Objective 3.4	23
Objective 3.5	24
Objective 3.6	24
Attachment 1. Pierce County Shellfish Partners Program Analysis	26
Attachment 2. Pierce County Shellfish Partners Budget and FTE Table	54

Partner Organizations

Tacoma-Pierce County Health Department

Pierce Conservation District

Pierce County Surface Water Management

Northwest Indian Fisheries Commission

Puyallup Tribe of Indians

Squaxin Island Tribe

Washington State Department of Health

Washington State Department of Ecology

Inquiries related to the Strategic Plan can be directed to the Tacoma Pierce County Health Department, Environmental Health Division, Cindy Callahan 253-798-4613, ccallahan@tpchd.org

Introduction

Water quality protection and improvement activities in the shellfish watersheds of Pierce County have been underway since the 1980s through the work of a number of local agencies. These efforts were first formalized as the Pierce County Shellfish Partners Program through the Key Peninsula-Islands Basin Plan prepared by Pierce County Surface Water Management (SWM) and adopted in 2006. This partnership has provided an ongoing and proactive pollution prevention, identification and correction program that has resulted in numerous successes, including the shellfish classification upgrade of Vaughn Bay. The partnership team has grown over the years to include additional partners and increase the effectiveness of the team's efforts.

This Strategic Plan was developed to enhance and address Pierce County Shellfish Partner's efforts to reduce bacterial contamination in the shellfish growing areas. This document describes the key elements of a fully functioning shellfish water quality prevention, identification, and correction program. Some of the components of this program may have already been in place, but in the process of formulating this plan improvements and additions have been identified to increase the effectiveness of several critical aspects of the program. This plan will be reviewed on an ongoing basis, along with a full programmatic review planned in 2017. This review will assess the overall progress of the Strategic Plan and adjustments will be made accordingly in an effort to reach the 2020 goals.

The companion document, *Pierce County Shellfish Partners Program Analysis*, provides additional background information and an estimate of the resources needed to meet the 2020 goals. Another companion document, Tacoma-Pierce County Health Department's *Pollution Prevention, Identification & Correction Manual*, provides specific details on pollution prevention, identification and correction activities.

Vision

Governments and stakeholders are actively working together to improve water quality in the shellfish watersheds of Pierce County.

Mission

Protect and improve shellfish watersheds by preventing, identifying and correcting sources of water pollution.

Goals

This plan is broken down into the following three main goals:

Goal 1: Prevent sources of water pollution

(Risk reduction strategies that address potential pollution sources)

Goal 2: Identify sources of water pollution

(Strategies that aid in locating and quantifying existing pollution sources)

Goal 3: Correct sources of water pollution

(Strategies that mitigate identified pollution sources)

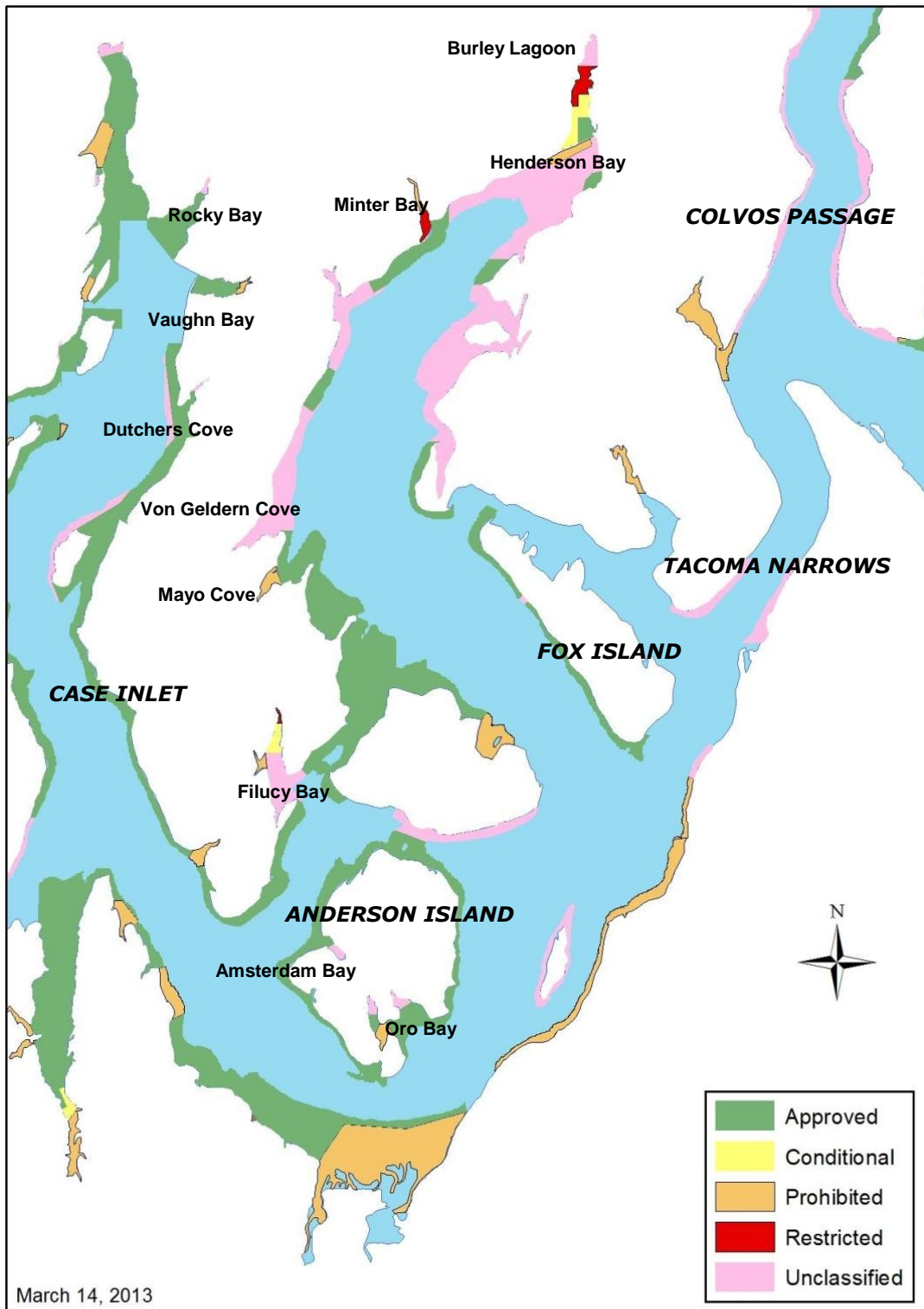
On the following pages you will find each **Goal** followed by **Objectives**, measurable **Targets**, the **Strategies** needed to meet the **Objectives** and the **Actions** needed to accomplish the **Strategies**.

Assumptions

As the population in Pierce County increases over time the impact to the shellfish areas will also increase. These impacts can be mitigated through the actions in the Strategic Plan and these actions will help support to improve water quality and trends within the shellfish areas of Pierce County.

Financial and political support will be available to accomplish the activities of the Strategic Plan.

Pierce County Shellfish Areas



Goal 1: Prevent Sources of Water Pollution. *Risk reduction strategies to address potential pollution sources.*

Objective 1.1: Implement Enhanced OSS Operation & Maintenance

TARGETS

- 1. By 2017 85% of OSS will be identified within the MRA and by 2020 95% of OSS will be identified within the MRA.**
- 2. By 2017 85% of OSS identified will be current with O&M within the MRA and by 2020 95% of OSS identified will be current with O&M within the MRA.**

Strategy 1.1.1 Technical Assistance

- Continue RSS for property sales
- TA for industry by TPCHD
- TA for public by industry
- TA to public from TPCHD (i.e.: septic socials, workshops, postcards)

Strategy 1.1.2 Increase the number of OSS with current O&M Inspections within the MRA

- Implement Communications Plan
- Expand enforcement capabilities
- Incentives (please refer to owner/operator incentives)

Strategy 1.1.3 Comparable O&M requirements in areas outside the MRA

- Review existing land use plans for future use
- Provide data to show water quality link
- Utilize successful actions from MRA

Strategy 1.1.4 Improve the quality of professional sector O&M

- Complete Task 5 from PIC Grant
- Coordinate with DOH for regional standards of practice for O&M
- Continue compliance activities by TPCHD (Renee)
- Continue communication to professionals (TPCHD)
- RME data review

Objective 1.2: Implement Enhanced Education/ Outreach

TARGETS

- 1. By 2017 Communication/Education Plans will be complete and implementation will be initiated to include an enhanced education and outreach component.*
- 2. By 2017 the number of participants in Technical Assistance programs will increase by 10% and by 2020 the number of participants will increase by 50%.*

Strategy 1.2.1 Technical Assistance

- Pre-purchase farm/ agricultural inspections
- Soil sampling and fertilizer strategies
- Manure share list
- Property owner inspections
- Surface water inspections
- Sanitary survey visits

Strategy 1.2.2 Information Workshops

- Farm
- Realtor
- Schools
- Professional services
- Boaters
- HOAs
- Residents

Strategy 1.2.3 Build a stewardship ethic

- Communicating benefits
- Earth economics
- Marketing
- Develop a “norm”
- Shellfish tissue sampling for citizens
- Shellfish gardening
- Shore stewards

Strategy 1.2.4 Develop and implement communication plans

- SWM 5-year Education Plan
- TPCHD Communication Plan

❖ **Strategy 1.2.4 Develop and implement communication plans (cont'd)**

- Watershed councils
- STORM (NPDES working group)
- Puget Sound Starts Here

Objective 1.3: State and Local Regulation Measures

TARGETS

1. By 2017 Shellfish Partners has regular communication with regulatory agencies to ensure that MRA targets are considered during regulation creation and revision, as well as policy development.

2. By 2020 Shellfish Partners guidance documents are referenced in land use decisions.

Strategy 1.3.1 Ensure Prevention is supported

- Review all current regulation
- Communicate with regulatory agencies
- Comment on applications
- Communicate with PALS
- Review permits

Strategy 1.3.2 Enhance current regulations

- Comment on proposals (i.e.: legislation)
- Develop guidance documents for shellfish resource areas
- Propose revisions to existing regulations

Strategy 1.3.3 Anticipate future efforts

- Create community support for future regulations
- Participate in regulatory process

Objective 1.4: Provide Owner/ Operator Incentives

TARGETS

- 1. 50% of properties within MRAs are aware of and receive preventative incentives by 2020.*
- 2. By 2020 have a 100% increase in acreage in conservancy status within the MRA.*

Strategy 1.4.1 Implement agriculture BMPs

- Cost share BMPs
- Equipment rental
- Landowner workshops
- Guidance documents
- Stream Team monitoring

Strategy 1.4.2 Implement OSS incentives

- OSS O&M inspection rebates
- Riser rebates
- Drain field maintenance rebates
- Pump-out coupons

Strategy 1.4.3 Property acquisition/ restoration

- PBRs (Public Benefit Rating System)
- Property purchase
- Identify priority areas
- TDR (Transfer Development Rights)
- Facilitate easements
- Support conservancy organizations
- Soft armoring/ bulkhead removal

Strategy 1.4.4 Boat and marina BMPs

- Incentives for marinas to distribute information
- Enviro-Stars type program
- Incentives for individual boat owners
- Mobile pump-out
- Stationary pump-out funding

Strategy 1.4.5 Stormwater BMPs

- Bulk bid for catch basin clean-out
- Loans for HOA stormwater facilities
- Credit program
- Pet waste bag stations
- Carwash kits
- Stormdrain marking
- Landowner LID incentives
- Natural yard care

Objective 1.5: Effective Communication

TARGETS

- 1. Complete the shared water quality database by 2017.***
- 2. Coordinate annual work plans by 2017.***
- 3. Targeted partner organizations are added by 2017.***

Strategy 1.5.1 Information sharing

- Water quality meetings
- Shared water quality database
- Continue to review results
- Watershed council meetings
- Annual DOH meetings
- Develop partnerships with conservation

Strategy 1.5.2 Promoting partnership Strategic Plan

- Use as guidance for annual work plans
- Participate/ track LIO efforts

Objective 1.6: Research

TARGETS

1. *By 2017 Shellfish Partners will identify where emerging technologies are peer-reviewed.*
2. *By 2020 a green technology database will be developed.*

Strategy 1.6.1 BATs (Best Available Technologies)

- Review Ecology's list
- Pertinent listservs (track national programs)

Strategy 1.6.2 BMPs

- Keep current with NRCS standards
- Keep current with the Ecology Stormwater Manual
- Track aquaculture issues

Strategy 1.6.3 Communication tools & techniques

- DOH webpage
- Puget Sound Partnership webpage
- Track other government information sharing tools (i.e.: govloop)
- Consider utilizing technological advances in delivering information (i.e.: online video workshops)

Strategy 1.6.4 Emerging technologies

- Keep current with WSU
- Review Ecology's TAPE list
- Experiment

Strategy 1.6.5 Community planning

- Work with Buildable Community staff
- Compile a green technology database
- Review traditional building environmental issues

Strategy 1.6.6 Climate change

- Monitor sea level rise
- Monitor ocean acidification

Objective 1.7: Evaluation

TARGETS

- 1. By 2020 surveys of area residents show that people who identify good water quality as important or very important has increased by 50%.*
- 2. By 2020 90% of residents in shellfish areas are aware of shellfish partners work.*
- 3. By 2020 trends indicate no further decline in water quality.*
- 4. Institutionalized annual review of outputs and outcomes by 2017.*

Strategy 1.7.1 Programmatic

- PCD soil sampling survey
- PCD BMP survey
- SWM compliance rates
- SWM WQI
- TPCHD QI process
- Farm inventory results

Strategy 1.7.2 Strategic Plan (Shellfish Partners)

- Review goals and objectives in 2017-2018
- Annual review of outputs and outcomes
- Consider Performance Measures
- Gap Analysis

Strategy 1.7.3 Community feedback

- Public opinion surveys
- Participant surveys
- Public interaction

Strategy 1.7.4 Training

- Internal staff
- Outside training

Goal 2: Identify Sources of Water Pollution. *Locating and quantifying existing pollution sources.*

Objective 2.1: Implement Enhanced OSS Operation & Maintenance

TARGETS

1. By 2017 85% of OSS will be identified within the MRA and by 2020 95% of OSS will be identified within the MRA.

2. By 2017 85% of OSS identified will be current with O&M within the MRA and by 2020 95% of OSS identified will be current with O&M within the MRA.

Strategy 2.1.1 Technical assistance

- Continue Report of System Status (RSS) for new property sales
- TA to industry by TPCHD
- TA to public by industry
- TA to public from TPCHD

Strategy 2.1.2 Increase the number of OSS current O&M inspections within the MRA

- Incentives
- Expanded enforcement capabilities
- Implement Communications Plan

Strategy 2.1.3 Implement comparable level of O&M outside MRA

- Utilize successful actions from MRA

Strategy 2.1.4 Improve quality of professional sector

- Coordination with RME
- PIC task 5
- Coordinate with DOH to have regional standards of practice
- Continue communication to professionals (TPCHD)

Objective 2.2: Implement Enhanced Education/ Outreach

TARGETS

1. By 2017 50% of residents in shellfish areas are aware of who to contact regarding water quality issues and 90% of residents are aware by 2020.

Strategy 2.2.1 Community awareness and reporting of water quality issues

- Property owners are aware of signs of water quality impacts
- Property owners are aware of who to contact regarding signs of water quality issues

Strategy 2.2.2 Education/ outreach to professional sector

- Workshops for professionals
- Regular communication (i.e.: newsletters)

Objective 2.3: Inspection/ Monitoring/ Sampling

TARGETS

1. By 2017 Shellfish Partners will have a comprehensive monitoring and reporting program established.

2. By 2017 all potentially large pollution sources in Pierce County that may affect shellfish area water quality will be identified.

Strategy 2.3.1 Response

- Short-term response to DOH sample results
- Threatened response to downgrade prevention
- Closure response
- Complaint referral response

Strategy 2.3.2 Sampling

- Shoreline evaluations
- Mussel tissue sampling
- Upland sampling
- TPCHD swimming beach sampling
- Investigative sampling
- BAT precipitation data
- PCD soil/ nutrient sampling
- SWM shellfish surface water
- Quality control

Strategy 2.3.3 Inspections

- Sanitary survey
- GIS high risk inventory
- Farm inventory
- PCD site visits
- SWM SW inspections (commercial, residential, public)
- Marina (CHB and Ecology)
- OSS inventory in MRA

Objective 2.4: Effective Communication

TARGETS

- 1. Identify components of shared, comprehensive database by 2017. Complete shared, comprehensive database by 2020.*
- 2. Target partner organizations by 2017.*
- 3. By 2017, Shellfish Partners will review the emergency response procedures and provide recommendations.*

Strategy 2.4.1 Information sharing

- Shared, comprehensive database including water quality data, GIS (land-use and zoning), project and compliance tracking
- Develop referral process
- Annual work plan

Strategy 2.4.2 Emergency response

- Disaster preparedness
- Response procedures

Strategy 2.4.3 Intra-agency communication

- Field staff training
- Consistency of procedures among divisions/groups

Objective 2.5: Research

TARGETS

- 1. By 2017 Shellfish Partners will have a process established to review emerging technologies for the identification of pollution sources.*
- 2. By 2020 Shellfish Partners will have a protocol that utilizes emerging technologies to enhance existing pollution identification.*

Strategy 2.5.1 Alternative pollution source ID

- Microbial source tracking
- Ribo-typing
- Screening compounds (i.e.: caffeine)

Strategy 2.5.2 Best Available Technologies (BAT) sampling

- Track Ecology's TAPE website
- DOH communication
- Explore listservs

Strategy 2.5.3 Effective local regulation

- Reference regulations from other jurisdictions
- Illicit Discharge Detection and Elimination (IDDE)

Strategy 2.5.4 Non-pathogenic pollution sources

- Bio-toxin, nutrients, temperature, pH
- Emerging contaminants (i.e.: endocrine-disruptors)

Objective 2.6: Evaluation

TARGETS

1. By 2017 Shellfish Partners will have an evaluation system in place to review identification strategies for effectiveness and adaptation based on program abilities to meet pollution identification goals.

Strategy 2.6.1 Strategic Plan

- Develop evaluation system

Strategy 2.6.2 Programmatic

- Annual review of each program and project by Shellfish Partners
- Annual review of progress on site-specific issues

Strategy 2.6.3 Trend analysis

- Annual review of identified sources (i.e.: numbers, types, repeat issues)

Goal 3: Correct Sources of Water Pollution. *Mitigating identified pollution sources.*

Objective 3.1: Pollution Correction Facilitation and Enforcement

TARGETS

- 1. By 2017, Shellfish Partners will have appropriate timelines to correct water quality impacts with owners/operators through either technical assistance or enforcement.**
- 2. By 2020, Shellfish Partners will reduce the correction timelines by 10%.**

Strategy 3.1.1 Enforcement

- Refer to Ecology
- Refer to Health Department Code Enforcement
- Illicit Discharge Detection and Elimination (IDDE)
- Refer to PALS (i.e.: aquaculture)

Strategy 3.1.2 Technical assistance

- Septic repair facilitator
- Provided by OSS industry
- SWM stormwater inspectors
- PCD farm planning
- Contact CHB
- Deficiency notification via RME

Objective 3.2: State & Local Regulation Measures

TARGETS

- 1. By 2017, Shellfish Partners will have had the opportunity to update, comment on, and when possible, improve existing regulations that address corrective actions within the shellfish areas.**
- 2. By 2017, Shellfish Partners will have the opportunity to review and comment on proposed regulations.**

Strategy 3.2.1 Support current efforts

- Illicit Discharge Detection and Elimination (IDDE) ordinance
- RCW 90.48.080
- State OSS 246.272A WAC
- Health Department CH2-OSS

Strategy 3.2.1 Support current efforts (cont'd)

- Health Department CH1-compliance
- Critical areas ordinance

Strategy 3.2.2 Enhance current efforts

- Identify mitigation areas
- Develop new surface water regulations
- Develop property access code
- Work to utilize PIC guidance by DPH/ Ecology
- County shoreline regulations
- Recommend appropriate animal densities

Objective 3.3: Provide Owner/ Operator Incentives

TARGETS

- 1. By 2020, Shellfish Partners will have consistent resource support for owner/operator incentives to correct water quality impacts in shellfish growing areas.***
- 2. By 2020, reduce the length of time taken to correct pollution sources by 20% through the use of incentives.***

Strategy 3.3.1 Agricultural BMPs

- Facilitate installation of agricultural BMPs
- Landowner water quality monitoring
- Mandatory surface water buffers (in accordance with water quality regulations(SMP))
- Landowner contract
- Engineering/ permit assistance
- Design assistance
- Facilitate federal programs
- Professional service contacts

Strategy 3.3.2 Septic Repair Grant & Loan Program

- Secure additional funding sources
- Obtain grant money (state and federal agencies)
- Continue repair team (SWM, TPCHD, CC)
- Continue HUD funding

Strategy 3.3.3 Property acquisition/ restoration

- Refer to Parks/ City
- Help influence prioritization
- Support grant application
- Property purchase
- Identify primary areas for acquisition
- Restoration and remediation

Strategy 3.3.4 Stormwater-Fee Reduction/ Loan Program

- Fee reduction
- HOA financial assistance
- Technical assistance
- Small grants

Objective 3.4: Effective Communication

TARGETS

- 1. By 2020, establish a new norm of acceptable residential practices to protect water quality.*
- 2. Establish annual report for the community and partners on corrective actions taken by 2017.*

Strategy 3.4.1 Information sharing

- Develop referral process
- Catalogue of corrective actions
- Notify DOH of correction
- Data portal-correction projects
- Notify partners nearby of water quality issues
- Health Department cross program coordination

Strategy 3.4.2 Build relationship with state agencies

- Routinely communicate water quality issues and resource needs
- Ecology attend coordination meetings

Strategy 3.4.3 Peer pressure working with and informing the public

- Shellfish industry
- Watershed councils
- Community
- Tribes
- Social marketing

Objective 3.5: Research

TARGETS

- 1. By 2017 Shellfish Partners will have a process established to review emerging technologies for the correction of pollution sources.*
- 2. By 2020 Shellfish Partners will have a protocol that utilizes emerging technologies to enhance existing pollution correction methods.*

Strategy 3.5.1 Emerging technology

- Determine effectiveness of emerging technologies
- Create database of high potential re-contamination risk areas

Strategy 3.5.2 BATs (Best Available Technologies)

- Participate in BAT research

Objective 3.6: Evaluation

TARGETS

- 1. By 2015, Shellfish Partners will establish a baseline for measuring timeliness of corrections.*
- 2. By 2017, Shellfish Partners will have established a feedback survey system of correction project implementers. By 2020, Shellfish Partners will have completed a community feedback survey.*
- 3. By 2017, Shellfish Partners will report to the community and partners on progress of Strategic Plan implementation.*
- 4. By 2020, trends will indicate no further decline in water quality, and the actions in the Strategic Plan will contribute to an addition of 232 approved acres of shellfish growing area.*

Strategy 3.6.1 Programmatic (ongoing, annual)

- Trend analysis
- Review water quality analysis with other agencies
- Establish a baseline for timeliness of corrections to sources impacting water quality

Strategy 3.6.2 Strategic Plan (2017-2018 evaluation)

- Review if goals are met
- Update Gap Analysis
- Action plan update
- Explore

Strategy 3.6.3 Community and partner feedback

- Feedback from shellfish industry
- Tribes/ EPA
- Ecology/ DOH/ Department of Agriculture
- PALS/ SWM/ PCD/ TPCD
- Non-profits
- Community (residents)
- Other industries (OSS, boating, etc.)
- Other agencies

Attachment 1: PIERCE COUNTY SHELLFISH PARTNERS PROGRAM ANALYSIS

The Pierce County Shellfish Partners report was originally developed as part of the Key Peninsula-Islands Basin Plan prepared by Pierce County Surface Water Management (SWM) which was adopted in 2006. The purpose of the report was to provide background information on current conditions relating to shellfish within Pierce County, describe existing programs and activities, and to identify the features of an ideal, fully functioning shellfish program. It is sometimes referred to as the “Gap Analysis” since the report identified differences between existing programs and that ideal. This version of the Gap Analysis has been updated to reflect the current Pierce County Shellfish Partners work and the expected resources needed to meet the 2017 and 2020 targets. This Gap Analysis serves as a companion document to the Strategic Plan. SWM has taken the lead role on development and update of the Gap Analysis and the Tacoma-Pierce County Health Department (Health Department) has taken the lead role on development of the Strategic Plan.

Economic Value of Shellfish

One of the most significant values of the shellfish industry to the community is as a source of employment. Data from Washington State Employment Security indicates that there are six employers in Pierce County under the category of Shellfish Production. Those six firms pay unemployment insurance for 180 employees. Of those firms, four are located on the Key Peninsula and pay insurance of 87 employees. There are a total of 147 total employers in all industries on the Key Peninsula with total covered employment of 839. Therefore, as of 2005, the 87 employees in the shellfish sector represent about 10.4% of all employment on the Key Peninsula. Sole proprietors and contract employees would not be included in these numbers, so there may be additional individuals receiving income from the shellfish industry within the KI Basin that are not included in the Employment Security data. According to the Washington State Department of Revenue, the shellfish industry had an income of almost \$46 million in 2011.

The aquaculture industry in Puget Sound has experienced a dramatic expansion within the past decade. This increase in income and the number of acres being actively managed for shellfish aquaculture has been driven by the market for geoducks. Geoducks have become a more viable product for growers with the establishment of improvements in seed production and predation prevention. These have been accompanied by increased demand (and prices) for geoducks, particularly from Asian markets.

Recreational Shellfish Harvesting

No data on the economic value of recreational shellfish harvesting or the numbers of individuals participating in recreational shellfish harvesting in Puget Sound or Pierce County were located. Revenue generated by visitors coming to the area, primarily for the purpose of harvesting shellfish, would most likely be attributed to tourism. Also, opportunities for recreational shellfish harvesting may add to the real estate value of certain properties within the basin, but, again, this information is not collected and tracked.

A study in Cape Cod, Massachusetts in 2002 (Damery & Allen, 2004) estimated the value of recreational shellfish harvesting to be \$7,400,000. A permit is required to harvest shellfish in Massachusetts. With

10,639 permit holders in 2002, it is estimated that the value of recreational shellfishing for a season to each permit holder was about \$700.

Environmental Value of Shellfish

Researchers have determined that shellfish provide a number of ecosystem services. They serve as a food source for a number of species (including humans), provide habitat for fish and other vertebrates and invertebrates, sequester carbon, stabilize habitat, increase habitat diversity, and filter water. (Grabowski & Peterson, 2007) Studies of their water quality impacts have demonstrated that shellfish can reduce the quantity of suspended solids and phytoplankton, but their most notable impact may be on reducing nitrogen. A Swedish study on the effect of mussel farming on the Gullmar Fjord showed that the net transport of nitrogen (dissolved and particulate) at the fjord mouth was reduced by 20%. (Lindahl, 2005) Other studies have found that adults, rather than juveniles, are the most effective at removing nitrogen. (Carmichael, 2012) Where natural bivalve populations have been reduced (e.g. oysters in the Chesapeake Bay and other estuaries) turbidity of estuarine waters has increased, promoting pelagic jellyfish explosions, and leading to widespread seagrass loss (Newell 2004).

SHELLFISH AND PUBLIC HEALTH

Shellfish are filter feeders. They draw large quantities of seawater through their bodies and feed on the plankton and other organic material contained in seawater. As a result of this feeding mechanism, shellfish may concentrate pathogenic microorganisms (i.e. microorganisms that may be harmful to human health) or naturally occurring toxins within their tissue.

Consumption of shellfish contaminated with pathogenic microorganisms or containing naturally occurring toxins may cause illness or death. For this reason, local and state health agencies are concerned about shellfish contamination from toxins, bacteria, viruses, and chemicals. They have the ability to close beaches for harvest if they receive any indications that the shellfish may be unsafe to eat.

Pathogenic Microorganisms

Bacteria and viruses in shellfish are a significant human health concern, and the primary reason why commercial shellfish beds within the KI Basin have been closed. Fecal coliform bacteria levels are measured as an indicator of the presence of pathogens because large numbers of microorganisms, some of which are pathogenic, are contained in fecal matter from warm-blooded animals. Pathogens that can adversely affect human health if they are consumed in shellfish may include, *Salmonella typhosa*, a bacterium that causes typhoid fever, *Etmamoeba histolytica*, a parasite that causes amoebic dysentery, and the Hepatitis A virus. Because shellfish are filter feeders, these pathogens can easily collect within their tissues and put the people who eat them at risk for disease. Septic systems, sanitary sewer systems, boats, livestock, pets, and wildlife are all seen as potential sources of bacteria. In general, shellfish contamination with fecal matter is more likely to result from human influences than from natural factors. Wildlife tends to be widely distributed in the environment and, as a result, has little effect on ambient microbial water quality. Exceptions may occur where wildlife concentrates, for example, near marine mammal haul-out areas, but land uses within the basin suggest that human influences are more likely.

The presence of fecal coliform bacteria in a sample of water or shellfish tissue merely indicates that it has been contaminated with fecal bacteria. It does not provide information on the source of the

contamination, so the contamination could originate from humans or it could originate from domestic animals or wildlife. In the last 15 years, a test has been developed that enables identification of the species from which fecal coliform bacteria originate. The test is complex and expensive and not suited to widespread application, but may serve as a useful tool in specific circumstances.

It is worth noting that the use of indicator organisms to evaluate the quality of water and shellfish introduces a safety factor because fecal coliform bacteria are usually much more abundant than pathogenic organisms in fecal matter. The safety factor is larger in the developed world, where the more serious water-borne diseases are rare, than in the developing world where water-borne diseases are endemic.

Within Puget Sound, one of the most problematic pathogens associated with eating shellfish has been *Vibrio parahaemolyticus* (*Vp*). *Vp* is a naturally occurring marine water bacteria that can cause illness through the consumption of raw or undercooked molluscan shellfish, typically during the warmer months of the year. These illnesses are of moderate severity, generally lasting 1-7 days, and are characterized by watery diarrhea and abdominal cramps. Little is known about the environmental factors that contribute to the growth and virulence of *Vp* bacteria in marine waters. However, proper temperature control during harvest, shipping, and storage minimizes growth of *Vp* within the shellfish. A serious *Vp* outbreak in Washington occurred in 2006 and DOH implemented an emergency rule for *Vp* control for the months of June through September of 2007. In 2008 the emergency rule was made permanent and included enhanced temperature control measures, additional recordkeeping requirements, and mandatory training for companies harvesting oysters intended for raw consumption.

In 2010 all of the Washington cases were sporadic cases. The recreational share of cases increased slightly in 2010, for a total of seven cases; there were also four reported cases of *Vp* resulting from exposure to other species. There were no voluntary recalls associated with *Vp* in 2010. In total, 29 Washington commercial shellfish growing areas were associated with *Vp* illnesses in 2010, with the majority originating from Hood Canal. *Girontia* (formerly *Vibrio*) *hollisae*, a new genus in the *Vibrionaceae* family, may be an emerging pathogen associated with molluscan bivalve shellfish. In 2010 there were six illness cases caused by *hollisa*; four of which were laboratory confirmed.

Naturally Occurring Marine Toxins

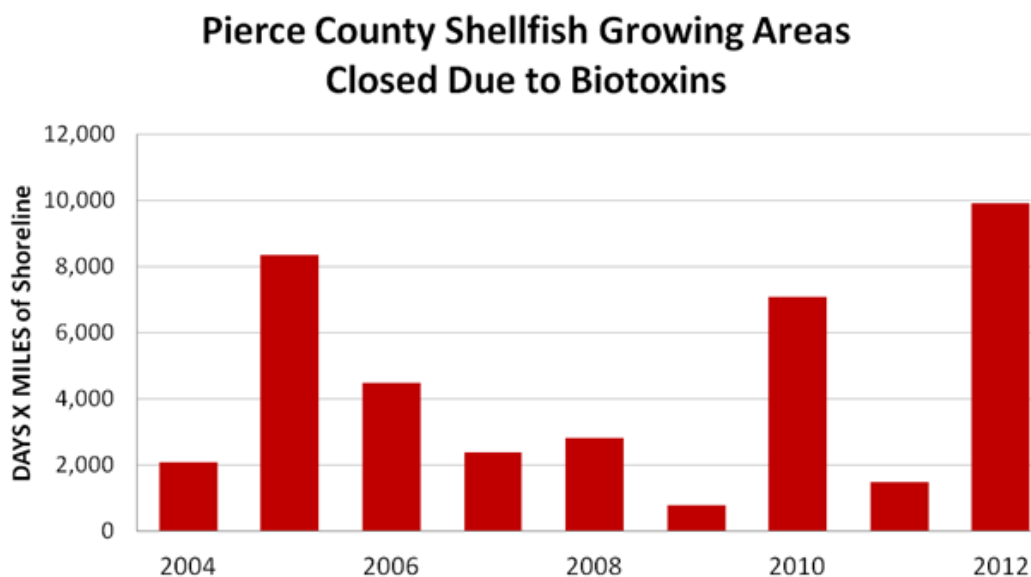
Some naturally occurring marine microorganisms produce substances that can be toxic to humans if shellfish tissues accumulate concentrations sufficient to harm consumers. Three diseases, paralytic shellfish poisoning, diarrhetic shellfish poisoning, and domoic acid poisoning, can be caused by eating shellfish that have accumulated high concentrations of certain organisms. Paralytic shellfish poisoning is caused by the dinoflagellate, *Alexandrium catenella*. Diarrhetic shellfish poisoning (DSP) toxins are produced by dinoflagellates *Dinophysis* and *Prorocentrum*. The main types of toxin associated with diarrhetic shellfish poisoning are okadaic acid, dinophysis toxins and pectenotoxins. Domoic acid poisoning is caused by diatoms of the genus *Pseudonitzschia*. The causative organisms are always present in marine waters but they reproduce rapidly (or “bloom”) when environmental conditions are favorable.

When *Alexandrium catenella* numbers increase greatly the episode is referred to as a “red tide” because marine waters may be discolored in certain circumstances. However, the presence or absence of discolored water does not accurately indicate that local shellfish are safe to eat. In *Washington State*, most outbreaks of poisonous shellfish have occurred in areas with absolutely no water discoloration. Washing and cooking may destroy bacteria and viruses, but does not remove the toxins or chemicals.

Once the toxic organisms die back or move on, the shellfish will eventually eliminate the toxins from their systems and become safe for consumption. Some species of shellfish are able to purge the toxin more quickly than others which are an important factor to consider when harvesting. Closures typically occur in the late summer and fall.

The frequency of “blooms” of microorganisms that can cause shellfish poisoning appears to be increasing (See Figure 1, below). The Health Department is finding that PSP advisories in Pierce County are occurring on an annual basis. The increased frequency is generally attributed to changes in climate and ocean conditions rather than to human influences. Controlling the amount of nutrients entering the saltwaters of the basin may be helpful in reducing the severity of “blooms” but is unlikely to prevent them. Thus, management efforts are directed toward preventing harm to human health when “blooms” occur. In 2012, Washington State had its first case of DSP so it is relatively new to the area. On the other hand, domoic acid was detected, albeit at non-hazardous levels, in Pierce County in the mid 2000’s but has not been detected in more recent years.

Figure 1.



Water Quality Standards for Shellfish Beds

The Washington Department of Health (DOH) has established standards for the quality of marine waters in shellfish harvesting areas that are designed to protect public health. The standards are based on guidelines developed by the National Shellfish Sanitation Program. To determine the compliance of a shellfish harvesting area with standards a minimum of 30 water samples must be taken and analyzed for fecal coliform content. Two statistics, a geometric mean and a 90th percentile value, are calculated from the 30 analytical results. The concentration of fecal coliform bacteria in marine waters over shellfish harvesting areas must not exceed a geometric mean of 14 organisms per 100 milliliters or a 90th percentile value of 43 organisms per 100 milliliters. The standards are the same for commercial and recreational shellfish harvesting.

Classification of Harvesting Areas

Commercial: DOH classifies commercial shellfish growing areas as “approved”, “conditionally approved”, “restricted” or “prohibited”. Shellfish may be harvested from “approved” areas and marketed directly to the public at any time. Shellfish may be harvested from “conditionally approved” areas and marketed directly to the public unless certain conditions exist. Rainfall is typically the limiting factor. For example, shellfish from a “conditionally approved” area may be harvested unless the area receives more than a half-inch of rain within a 24-hour period, if those are the specific conditions for that bed.

Shellfish harvested from “restricted” areas may not be marketed directly to the public. They must be moved or “relayed” to an “approved” area where they will naturally purge any contaminants. After several weeks or months in the “approved” area they may be harvested and marketed directly to the public. Shellfish may not be harvested for sale from “prohibited” areas under most circumstances, both environmental and policy. “Prohibited” areas include areas near marinas and sewer outfalls by DOH policy.

A commercial growing area’s classification is determined by conducting a sanitary survey. The sanitary survey has three components:

A shoreline survey. The purpose of the shoreline survey is to identify point and non-point pollution sources that may affect water quality in growing area.

Marine water sampling. The purpose of marine water sampling is to determine fecal coliform bacteria levels in waters at the growing area.

A meteorological and hydrographic evaluation. The purpose of the evaluation is to determine how weather conditions, tides, stream flow, etc, might affect the distribution of pollutants in and near the growing area.

Areas where marine waters meet coliform standards but where the sanitary survey reveals a significant pollution threat are not classified as approved until the threat is eliminated.

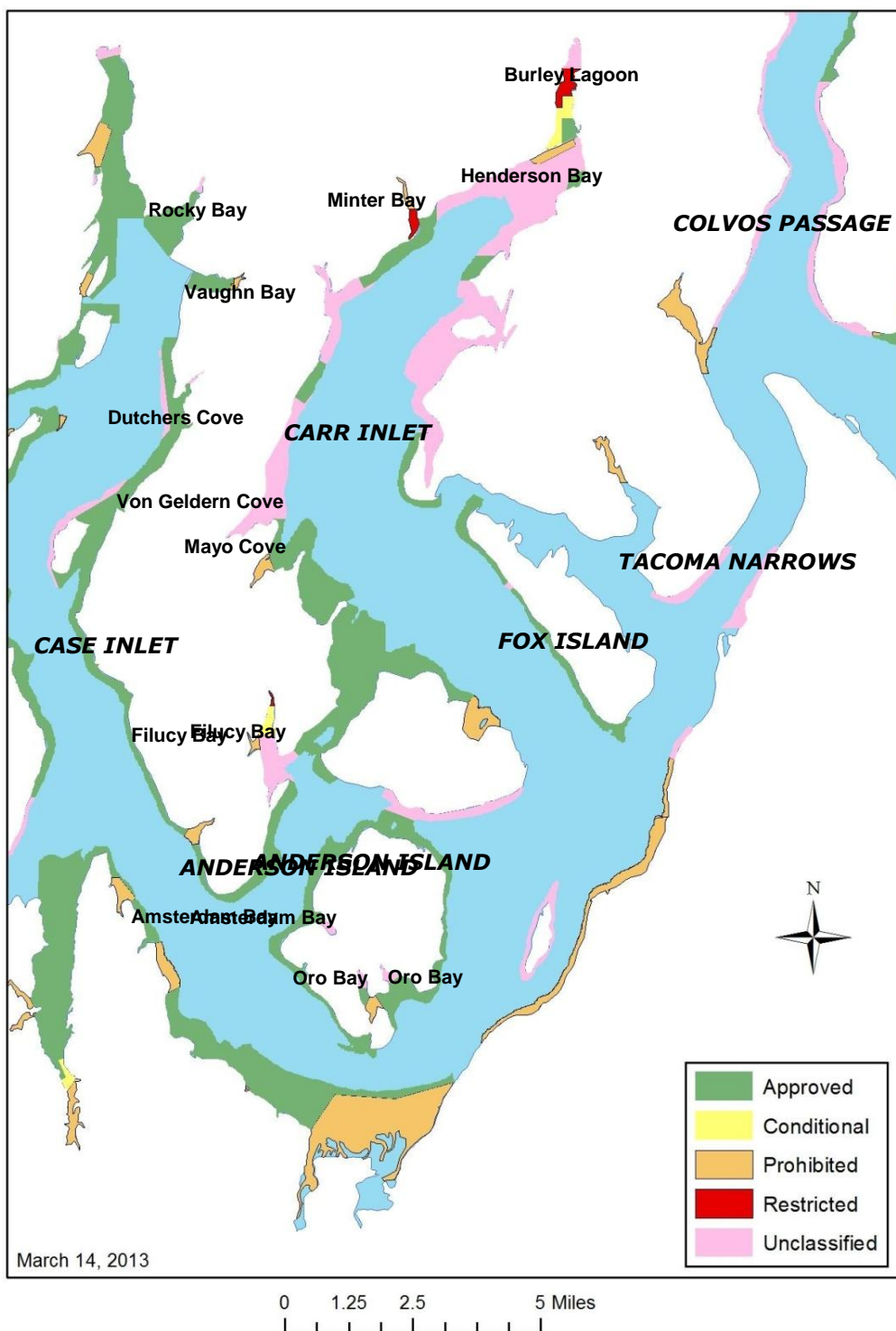
Recreational: DOH classifies recreational shellfish harvesting beaches as “approved”, “advisory”, “closed” and “unclassified”. “Approved” beaches meet sanitary standards for shellfish harvesting. The “advisory” classification is given to beaches where special circumstances might make shellfish harvesting risky at certain times, for example seasonal use of a marina. The “closed” classification is given to beaches that either lie within a “prohibited” or “restricted” area for commercial shellfish harvesting or do not meet sanitary standards for shellfish harvesting or are in areas closed by DOH policy.

Figure 2 shows the DOH classified shellfish harvesting areas in the KGI Watershed and Table 1 lists classification changes. There are fourteen commercial shellfish harvesting areas and 23 recreational harvesting areas. There are over 8,400 acres of Approved growing area in Pierce County and 5,673 Unclassified acres that could be considered potential growing area.

In addition to these formal classifications, DOH may also assign growing areas a “Threatened” or “Concerned” status in their annual growing area reports. “Threatened” areas could soon be downgraded in classification because water quality is close to failing the standard, or because existing

pollution sources may impact public health. Areas "of concern" still meet the standard for their current classification, but the water quality is declining.

Figure 2. Classified Shellfish Areas of Pierce County



Response to Downgrades

In 1992, the Washington State Legislature enacted laws to “prevent further closures of recreational and commercial shellfish beds, to restore water quality in saltwater tidelands and to allow the reopening of at least one closed shellfish bed each year, and to ensure Washington State’s commanding international position in shellfish production” through RCW 90.72. The Legislature found that failing on-site sewage systems and animal waste were the primary causes of shellfish bed closures in the decade before passage of the legislation. The legislation delineated procedures for the formation of shellfish protection districts by counties. Creation of the district includes preparing a closure response plan to control non-point source pollution by decreasing contaminants in storm water and ensuring that animal grazing and manure management practices are consistent with best management practices. The legislation noted that elements may be omitted from plans if they are effectively addressed by an existing program. The legislation *requires* the formation of shellfish protection districts within 180 days of an official downgrade. No provisions for financial assistance or incentives were included in the legislation.

Three shellfish protection districts have been created in Pierce County for Burley Lagoon, Rocky Bay and Filucy Bay. When an area is designated as a shellfish protection district, SWM, Health Department, and Pierce Conservation District (PCD) prepare a closure response plan and intensify their monitoring and inspection efforts. DOH, Ecology, and the Puget Sound Action Team (the predecessor to the Puget Sound Partnership) have participated in the closure response planning process in the past.

Classification Changes

Table 1. Growing area classification changes in the KGI Watershed

Growing Area	Upgrades		Downgrades	
	Year	Acres	Year	Acres
Burley Lagoon	2005	99	2005 2008 2010	27 21 35
Henderson Bay/ Minter Bay	2007 2013	40 111	2006	40
Vaughn Bay	2008 2011	104 50		

Shellfish Planning within Pierce County

Since the mid-1980's bacterial contamination has impacted shellfish growing areas in the Key Peninsula-Gig Harbor-Islands (KGI) Watershed. Since that time, a number of plans and activities have been developed to address the problem, including:

Burley-Minter Basin Water Quality Plan (1988)

Mayo Cove/Penrose Point Shellfish/Water Quality Plan (1995)

Rocky Bay Shellfish Protection District & Program (1996)

Burley Lagoon Shellfish Protection District & Program (1999)

KGI Watershed Action Plan (2000)

Rocky Bay Subwatershed Plan (2000)

Filucy Bay Shellfish Protection District & Program (2001)

Key Peninsula-Islands Basin Plan (2006)

All of these plans include provisions to address and protect against shellfish downgrades. To date, none of these plans have been fully implemented and funded.

CURRENT ORGANIZATIONAL ROLES AND RESPONSIBILITIES

Federal, state and local agencies all play a role in ensuring that public health is not harmed by consumption of contaminated shellfish.

Local

Tacoma-Pierce County Health Department (Health Department)

The Health Department's role is to prevent contamination of shellfish harvesting areas as a result of sewage disposal and other waste management practices. It conducts sanitary surveys to identify sources of bacterial contamination that include inspections of shoreline properties, shoreline water sampling and analysis, and dye-testing of on-site sewage systems. The Health Department conducts routine shoreline surveys and inspections in shellfish harvesting areas and watersheds at a minimum frequency of once each year. The surveys include sampling for fecal coliform and occasionally for other water quality parameters.

The Health Department also conducts sanitary surveys and upland investigations routinely and in response to reports of bacterially contaminated conditions. The sanitary surveys and investigations may include fecal coliform sampling to locate sources of bacteria and dye testing of suspected failing on-site sewage systems. If the bacteria source is found to be poor animal keeping practices, The Health Department sends a letter to the property owner notifying them of the problem and referring them to work with PCD to address the problem. If the property owner chooses not to work with PCD, the Health Department refers the site to Ecology for further actions.

Usually, on-site investigations are conducted on a voluntary basis but the Health Department has the authority to obtain a warrant for on-site inspections if the results of shoreline investigations suggest that a failing septic system may be the cause of elevated fecal coliform concentrations. If the source of contamination is a failing septic system, the Health Department works with the property owner to correct the problem. The Health Department's protocols and guidelines are described in the document, Pollution Prevention, Identification & Correction Manual (Health Department, 2013). Limited assistance

to property owners wishing to repair or replace their failing systems may be available through grants or loans which are currently administered through Pierce County Community Connections.

Operation and Maintenance Program: The Health Department's Septic System Operation and Maintenance (O&M) Program works to ensure that septic systems are located and installed correctly and kept in good working condition. Septic systems are ranked as Low, Moderate, or High risk based on the type of system and where it is located. The O&M Program requires that the participating systems are professionally inspected on a regular basis to insure that they are working properly. Septic professionals are required to document their septic system inspections, minor repairs and tank pumping in a web-based database referred to as online RME (www.onlinerme.com). RME stands for Responsible Management Entity. This database, which is accessible to the public, is used to track the operation and maintenance of septic systems in Pierce County.

Another significant component of the O&M Program is education, providing materials and information to homeowners on how to care for their particular system. With the help of community members and business professionals, the Health Department is implementing a campaign to educate homeowners and to encourage them to adopt actions which are protective of water quality.

The initial activities will focus in the Key Peninsula. The Key Peninsula portion of the KGI Watershed was designated as a Marine Recovery Area (MRA) in 2007 through the Health Department's On-Site Sewage Management Plan and covers approximately 63 square miles. The Health Department will pilot a septic system maintenance and water quality education and outreach campaign to evaluate the effectiveness of the campaign for possible replication in other communities in Pierce County. They will work with the residents and the community to foster an understanding of the value of environmentally healthy marine shoreline water quality, and the necessity for an active operation, maintenance and correction program within the environmentally sensitive areas of the KGI. This will be accomplished through advisory group meetings, workshops, septic socials, family events, public meetings and educational materials and resources made available to the community.

Pierce Conservation District (PCD)

PCD's role is to promote proper management of farm resources, including proper handling of livestock waste. PCD can provide technical and financial assistance when water quality issues are identified on agricultural lands. They also encourage land owners to develop farm plans which include Best Management Practices (BMP's) to address water quality issues. If other agencies suspect that animal wastes are contributing to bacterial contamination of shell-fishing waters, then a referral is made to PCD through a referral protocol. In response, they will contact the property owner and offer assistance. PCD may also conduct area wide farm and animal inventories. These inventories include identification of priority farms that may be the most likely sources of contamination. Landowners of priority farms are then invited to utilize District services. PCD does not have enforcement authority and avoids adversarial relationships with landowners. They encourage landowners to voluntarily adopt BMP's for management of animals and animal wastes. PCD also houses the Pierce Stream Team. This is an effort to conduct trained water quality monitoring and facilitate volunteer planting efforts along streams.

In 2004, the Pierce County Council established a \$5 per parcel property assessment to fund PCD activities. In 2012, this assessment was converted to a per parcel rate-based funding program that varies by land type.

Pierce County Public Works and Utilities, Surface Water Management (SWM) Division

SWM is responsible for managing surface water in unincorporated areas of Pierce County. It builds and maintains road culverts, storm water conveyance systems and other surface water management facilities and prepares watershed and storm water management plans. It also takes the lead in ensuring that the county complies with its NPDES Phase I Municipal Stormwater Permit. SWM's legal obligation under its NPDES permit is to manage storm water in a manner that prevents pollution of surface waters, including bacterial contamination. It has the authority to cite dischargers of pollutants into surface waters of Pierce County.

When the Washington State Department of Health, downgrades a shellfish growing area classification for a bed in Pierce County, state law requires that the local jurisdiction establish a Shellfish Protection District. Within Pierce County, SWM is the designated lead for that process and for coordinating the development of a closure (or downgrade) response plan.

SWM conducts water quality monitoring as part of its water quality duties. Currently, SWM collects water quality samples at 24 sites in the KGI Watershed on a monthly basis and at 31 upland shellfish-related sites on a quarterly basis.

Since 2008, SWM has been tracking and reporting the water quality status of Pierce County waterbodies in an annual Watershed Health Report Card. Streams and lakes are *graded* on a scale of "F" (failing) to "A" (excellent) based on an index of water quality and biological indicators. (Monitoring data and the Report Card are available on the web at www.piercecountywa.org/watershedhealthdata). In late 2011, SWM initiated an effort aimed at improving the surface water quality of Minter Creek, Horn Creek Swan Creek and Spanaway Lake. The goal of the "Raise the Grade" program is to improve water quality in Minter Creek, Horn Creek, Swan Creek and Spanaway Lake so that their existing grades and the compliance ratings of stormwater management facilities contributing pollutants to those waterbodies are improved ("raised").

Also, SWM routinely inspects stormwater facilities for potential sources of pollution and rates their status of compliance with stormwater requirements. Facilities are *graded* on a scale of "1" (significant noncompliance) to "5" (exceeds requirements). In 2011, approximately 12% of privately-owned stormwater facilities in Pierce County received grades of 1 or 2.

Pierce County Community Connections (PCCC)

The Pierce County Community Connections (formally Pierce County Community Development) was created to administer loans to low income property owners using federal housing monies. In 2007, when Pierce County received state grant and loan funds to finance septic system repair and replacement projects, Community Connections was enlisted to administer the application and underwriting process. The PCCC works in concert with a non-profit board, the Pierce Community Development Corporation (CDC), to offer loans. From 2007 through 2012, 47 failing septic systems, many of which are located in the KGI Watershed, were repaired utilizing funding assistance.

Pierce County Planning and Land Services (PALS)

Pierce County Planning and Land Services (PALS) is the agency within Pierce County charged with administering land use planning and implementation. It is also the agency that permits commercial

shellfish operations. This organization drafts and presents new regulations related to land development and acceptable land uses to the Pierce County Council, but also ensures compliance with existing regulations through the development permitting process and enforcement. PALS is currently working with a multi-stakeholder group to update Pierce County's Shoreline Master Program.

Pierce County Sheriff and Prosecuting Attorney

The Pierce County Sheriff's and Prosecuting Attorney's Departments are traditionally thought of as the primary enforcers of regulations. However, in the case of water quality concerns, they are often in a support position. A sheriff may be asked to accompany other agency staff when serving a notice of violation and the prosecuting attorney may pursue prosecution of a significant violator, but usually that is only if they are asked to do so by the enforcing agency. Still, they both have a pivotal role in water quality enforcement actions, because their participation is often necessary to resolve the most onerous violations and to reinforce the importance of these regulations.

Kitsap County Agencies

A significant area of the land draining into some Pierce County shellfish growing areas is under the jurisdiction of Kitsap County. The Kitsap Public Health District has an active pollution identification and correction (PIC) program with a primary focus on identifying and correcting failing septic systems as well as ensuring proper animal keeping practices. They collect water quality samples and use the results to identify potential pollution sources and they provide enforcement for both septic system and agricultural sources. The Kitsap Conservation District provides farm planning and agricultural BMP implementation support. Kitsap County has established a surface water management utility which provides funding for both programs. Onsite repair financial assistance in Kitsap County is provided by an organization called *Craft 3* (formerly known as Shorebank) which offers low interest loans to finance repairs. Finally, Kitsap County has a Cooperative Extension service that partners with Washington State University. Kitsap County's Cooperative Extension supports the Kitsap Beach Watchers program which trains residents to become shoreline stewards in return for a certain number of volunteer hours. Pierce County residents have taken the Kitsap Beach Watchers training and Harbor WildWatch has partnered with Kitsap Beach Watchers to provide shore steward training at locations within the KGI Watershed.

Local Non-Governmental Organizations

Watershed Councils

Watershed Councils are multi-stakeholder groups committed to implementing the Watershed Action Plans and protecting and preserving local water quality and beneficial uses of water. Watershed Councils operating within Pierce County include the Key Peninsula-Gig Harbor-Islands (KGI) Watershed Council, the Chambers-Clover Watershed Council, the Puyallup River Watershed Council, and the Nisqually River Council. The Councils offer opportunities for members to network and coordinate efforts. Most Council activities have focused on networking and coordinating public education and outreach.

Harbor WildWatch (HWW)

Harbor WildWatch is a nonprofit providing marine stewardship education programs in the Gig Harbor and Key Peninsula areas. They provide classroom presentations to all of the schools in the Peninsula

School District and beach programs at public parks throughout the area. They offer stewardship training for school age children through their SeaStars and SunStars programs. Recently, they have partnered with the Kitsap Beach Watchers program to offer Shore Stewards training within the KGI Watershed.

Citizens for a Healthy Bay (CHB)

Citizens for a Healthy Bay is a nonprofit based in the Tacoma area. CHB offers Clean Boating education programs and derelict vessel/marine debris response within the KGI Watershed. In 2012, CHB performed 35 patrols averaging 50 miles each within the KGI Watershed.

Alliance for a Healthy South Sound (AHSS)

The AHSS was created in 2011 as a local implementing organization of the Puget Sound Action Agenda priorities. (See “Puget Sound Partnership” description for more information on the Puget Sound Action Agenda.)

Great Peninsula Conservancy

The Great Peninsula Conservancy is a private nonprofit land trust dedicated to protecting pristine shorelines, critical salmon streams, evergreen forests, and wildlife-rich wetlands throughout Kitsap, Mason, and west Pierce counties, Washington. Currently, the Great Peninsula Conservancy manages ~ acres within the KGI Watershed.

Indian Tribes

The Squaxin, Nisqually, and Puyallup Indian Tribes all have usual and accustomed fishing areas within the KGI Watershed. This means that these tribes have rights to collect shellfish in the watershed that are secured by treaty.

There are certain procedures that tribes must follow to act on their shellfish rights. First, they must complete a survey or inventory of the shellfish in the area where they wish to collect and, as a result, they are then entitled to collect one half of the annual sustainable yield of the bed. To illustrate, a bed may have 400 pounds of shellfish, but the sustainable yield for the bed may be only 100 pounds per year. In this example, the tribe may take no more than 50 pounds per year.

Washington State Agencies

In December 2011, guided by the national effort, Washington State’s Governor Christine Gregoire launched a new Shellfish Initiative with the intention of restoring and expanding Washington’s shellfish resources to promote clean-water commerce and create family wage jobs. The initiative’s components include:

Expanding, promoting and improving shellfish aquaculture in Washington;

Increasing opportunities for and improving access to public tidelands for recreational shellfish harvesting;

Restoring native shellfish habitat and populations such as the Olympia oyster and pinto abalone; and

Improving and protecting water quality to help ensure healthy and safe shellfish for consumers.

Department of Health (DOH)

The responsibility for preventing illness or death from eating contaminated shellfish in Washington State is shared by DOH and local health agencies. DOH determines the suitability of various areas for commercial shellfish growing and regulates commercial harvesting from these areas. It also determines the suitability of beaches for recreational shellfish harvesting and, working with local health agencies, provides the public with the information they need to determine where and when it is safe to harvest shellfish.

Once a shellfish harvesting area has been classified, DOH monitors the area and may reclassify it if conditions change. DOH's monitoring is a part of a larger program designed to continually assess the environmental health of Puget Sound (Puget Sound Ambient Monitoring Program). DOH uses a systematic random sampling strategy to sample shellfish harvesting areas as recommended by the National Shellfish Sanitation Program. Sampling events are scheduled in advance at relatively fixed intervals. Approved areas are sampled at least six times each year. Conditionally approved areas are sampled at least 12 times each year. Although it would be desirable to sample more frequently, sampling in some restricted areas has been reduced to six times each year due to budgetary constraints. The results of monitoring are used to check the classifications of the shellfish harvesting areas and to provide an early warning of deteriorating quality in shellfish harvesting waters. DOH issues a warning to public agencies and private parties when the 90th percentile value of coliform counts at any sampling station exceeds 30 organisms per 100 ml of water.

DOH also conducts periodic shoreline surveys and meteorological and hydrographic evaluations. They are conducted less frequently than marine water quality sampling. Since 2005, DOH has completed shoreline surveys of Henderson Bay, Burley Lagoon, Oro Bay, West Key Peninsula, Filucy Bay, Fox Island, Drayton Passage, Rocky Bay, and Vaughn Bay growing areas. Wyckoff Shoal, Penrose Point, Von Geldern Cove, and Anderson Island growing areas were surveyed in 2002-03 and DOH is scheduling updated surveys for these areas.

DOH compiles and manages data from its statewide shellfish sampling program and publishes annual inventories that present data gathered and highlight trends. The report is published 12 to 18 months after the data is acquired. If fecal coliform sampling counts indicate that a shellfish area should be reclassified or trends indicate that an area is deteriorating, DOH notifies Pierce County and the Health Department.

Finally, DOH administers grant funds that support local programs aimed at reducing sources of bacteria and toxins to surface and ground water.

Department of Ecology (Ecology)

The U.S Environmental Protection Agency has delegated responsibility for administering and enforcing the federal Clean Water Act in the state to the Ecology. Ecology issues permits to discharge wastewaters to the surface waters of the state as part of the National Pollutant Discharge Elimination System (NPDES). Individual permits are issued to point sources of contamination including municipal wastewater treatment plants, industrial discharges, and to large animal husbandry operations (Referred to as confined animal feeding operations (CAFOs)). NPDES Phase I and Phase II Municipal Stormwater Permits which regulate municipal separate storm sewer systems (MS4s) covering large, medium and

small municipal storm sewer systems respectively are issued to counties, cities and other entities who own and operate the system. Pierce County, City of Tacoma and Port of Tacoma are Phase 1 permittees.

Currently, Ecology has the clearest authority to enforce against farms that violate the Clean Water Act. This includes farms that are too small to require a permit.

Department of Natural Resources (DNR)

DNR manages state-owned lands including tidelands. Many shellfish beds are located on DNR property that has been leased to a commercial grower. As the landowner, DNR has the ability to set the terms of leases for tidelands including requiring conditions protective of shellfish.

Washington State Parks

Washington State Parks awards grants to both public and private sector boating facility operators for the construction, renovation, operation and maintenance of pumpout and dump stations for use by recreational boaters. The program also provides boater education to promote public awareness about boat sewage and its proper disposal.

Washington Sea Grant

The Sea Grant program links marine-related academic efforts at the University of Washington to Puget Sound communities. The goal of the program is to support Washington residents who wish to make productive use of marine resources, while preserving and helping to restore the essential qualities of a healthy marine environment. Sea Grant supports research, education, outreach, and communication projects.

Puget Sound Partnership

The Puget Sound Partnership (Partnership) was created by the Washington State Legislature in 2007. The primary purpose of the Partnership was to develop an Action Agenda for the protection and recovery of Puget Sound. The Partnership published their first Action Agenda in 2009. Although the original Gap Analysis preceded the Action Agenda, it would implement a number of the priorities in the Action Agenda including:

A.4.4 - Promote working aquatic lands that are protective of ecosystem health to provide abundant shellfish for commercial, subsistence, and recreational harvest consistent with ecosystem protection.

C.6 - Continue to monitor swimming beaches as well as conduct shellfish and fish advisory programs to reduce human exposure to health hazards.

C.4.1.3 - Establish on-site sewage management utilities to ensure that existing septic systems and large onsite septic systems are well maintained, and increase capacity of local health jurisdictions and the Department of Health to implement on-site sewage management plans.

D.1.2 - Integrate and coordinate implementation of existing Sound-wide and local plans and programs to improve efficiency and effectiveness in addressing Action Agenda priorities.

Federal Agencies

The National Shellfish Sanitation Program, a program of the U.S. Food and Drug Administration, is a federal, state and industry voluntary cooperative program that relies on regulatory controls by states to ensure safe molluscan shellfish. It publishes guidelines for use by states in establishing and managing their own programs.

The Environmental Protection Agency (EPA) has a Strategic Plan that has national priorities for water quality, human health, and the environment. EPA administers grants through the National Estuary Program in support of these priorities. In addition, EPA oversees compliance with the Clean Water Act.

The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) is the federal agency responsible for the stewardship, management, conservation and protection of living marine resources within the United States' Exclusive Economic Zone (water three to 200 mile offshore). In addition to stock management, NOAA provides inspection services for fish, shellfish, and fishery products. The NOAA Seafood Inspection Program is often referred to as the U.S. Department of Commerce (USDC) Seafood Inspection Program and uses marks and documents bearing the USDC moniker. The NOAA Seafood Inspection Program assures compliance with all applicable food regulations. The Program offers product quality evaluation, grading and certification services making certain products eligible for stamping with official marks, such as the U.S. Grade A. NOAA issues health certificates for the export of fish products to foreign countries. In 2011, NOAA launched a National Aquaculture Policy that included a *National Shellfish Initiative* to increase shellfish aquaculture for commercial and restoration purposes, stimulating coastal economies and improving ecosystem health.

Permitting

Permitting requirements and review processes affect shellfish in Pierce County in two ways, either by evaluating the impacts to shellfish from new development or from the establishment of new commercial shellfish growing operations.

Permitting of new aquaculture has become increasingly contentious within Pierce County. In the past, net pens for rearing fish and rafts for raising bivalves have drawn unfavorable responses from nearby residents due to their perceived impacts on aesthetics, water quality, and privacy. Since 2000, the County has experienced a dramatic increase in the number of applications to establish new growing areas for geoduck aquaculture. Geoduck aquaculture is usually accompanied by the installation of predation devices. Sections of PVC pipe are installed vertically within the substrate and geoduck "seed" are placed within each pipe. These pipes are usually placed in a grid pattern and covered with netting. Neighboring shoreline property owners have organized to discourage installation of new geoduck tracts, expressing concerns about the aesthetic and environmental impacts. The primary environmental impacts cited include risks to wildlife caught in exclusion netting, debris generation, and sediment disruption during harvest.

Projects proposed within nearshore shoreline areas may require authorization from the US Army Corps of Engineers, the Washington State Department of Ecology, the Washington State Department of Natural Resources, and/or the Washington State Department of Fish and Wildlife. Necessary permits from local jurisdictions may include State Environmental Policy Act review, critical areas ordinance permits for wetlands or fish and wildlife, and Shoreline Management Act review for compliance with Pierce County Shoreline Master Program. Finally, new shellfish growing areas must obtain a Harvest Site

Certificate from the Washington State Department of Health to confirm that water quality in the area of the harvest meets standards.

SUMMARY OF CURRENT ORGANIZATIONAL ROLES AND RESPONSIBILITIES

Numerous local, state, federal and non-profit organizations play different roles in the protection of shellfish resources of Pierce County. Most of these roles and activities are focused on water quality in general, with only incidental shellfish orientation. Programs that specifically address shellfish issues are typically added duties to other priorities.

Virtually all programs between governmental entities involve informal arrangements. Data collection and information sharing among agencies and with the public is generally reactive rather than preventive focused. Much of the funding is contract services or grants. Financial and technical assistance to property owners is sparse or lacking entirely. There is no specific unifying local legislative framework in place.

RECOMMENDATIONS TO IMPROVE THE PIERCE COUNTY SHELLFISH PARTNERS PROGRAM

Recommendations to develop a coordinated shellfish response were included in the 2006 Gap Analysis and led to the formation of the Pierce County Shellfish Partners Program. The current recommendations are included in the 2013 Strategic Plan.

PIERCE COUNTY COORDINATED SHELLFISH RESPONSE PROGRAM (Gap Analysis)

This assessment is updated from an evaluation performed in 2005. The original assessment can be found in Appendix M of Pierce County Surface Water Management's *Key Peninsula-Islands Basin Plan* which was adopted by the Pierce County Council in 2006. This document can be found at www.piercecountywa.org/swm in the "Library" under "All Basin Plans". That document concluded that Pierce County's approach to preventing shellfish closures could be improved by providing specific additional resources and by formalizing inter-agency coordination. In the 2005 analysis key areas identified as needing enhancement included:

- Increased formal coordination, information collection and sharing;
- Increased technical and financial assistance to property owners, residents, and business operators;
- Increased law and justice capability;
- Stable, long-term funding support for Shellfish Partners' programs.

The following describes in detail the 2012-13 key elements needed for a fully functioning shellfish response program. Some of the components of an effective and fully functional shellfish management program are currently in place, but improvements are needed to increase the effectiveness of several critical aspects in the program. Gaps in the current program are discussed below.

Core Assumptions of the Coordinated, Fully Functional Program

Information and assistance must be provided to citizens so they will both choose behaviors and have the resources they need to reduce their impact on water quality.

Clear and unified shellfish protection objectives are needed to focus the agencies involved in achieving them, together with ramifications for failure to perform.

A management structure is needed which will compel the multiple governmental institutions involved to coordinate their services and actions.

As the population in Pierce County increases over time, the impact to the shellfish areas will also increase, unless mitigated.

Financial and political support will be available to accomplish the activities of the Strategic Plan.

Objectives of the Coordinated, Fully Functional Program

The following Objectives are vital in preventing, identifying, and correcting existing and potential pollution sources:

Enhanced On-site Sewage System Operation & Maintenance

Education/ Outreach

Effective Communication

Inspection/ Monitoring/ Sampling

Pollution Correction Facilitation and Enforcement

Owner/ Operator Incentives

State and Local Regulatory Support

Research

Evaluation

Enhanced On-site Sewage System Operation & Maintenance

Program Gaps

The Health Department implemented the O&M program in 1997, three years ahead of Washington State's mandate. At that time approximately 80,000 on-site systems were being used in Pierce County. The program was intended to eventually capture all new and existing on-site systems in an Operation & Maintenance (O&M) Permit program.

In 2005, the Report of System Status was required for all real property title transfers. The report gives a level of assurance that a septic system will function properly for the new property owner. In addition to an inspection of the septic system area, Health Department staff provide educational materials to new owners when they first start using the septic system so they can better understand proper use and care of their septic system.

Current program gaps for technical assistance programs occur because property owners are not aware of the programs. Many property owners may not want to contact an agency for technical assistance due to the fear of high cost repairs or fear of enforcement action. Also, there is no guarantee that the property owners at greatest risk for generating pollution will be the ones to utilize the assistance offered.

Progress and Status

The biggest change is that electronic reporting of septic inspections and pumping has now been initiated through a system called RME (Responsible Management Entity).

There is continued program marketing, public education and outreach to the system user. This work includes development of new educational materials and update of existing material that will attract the public's attention and get them to understand how a fully operational septic system can be economically and environmentally beneficial.

The expansion of program coverage to known and not-yet-discovered existing septic systems which need to be in the program by regulation is an ongoing effort. This entails identifying and enrolling the remaining high and moderate risk systems such as mobile home parks, commercial, community, multi-family and older systems near a water body as well as Pressure Systems.

To accomplish this, staff resources must be focused on a means of identifying the risk to public health of all septic systems in Pierce County if a failure occurs.

Strategic Plan Response

The Strategic Plan addresses the need to have up to date operation and maintenance of septic systems within the MRA as well as improved identification. This will be accomplished through the implementation of a strategic communications plan and technical assistance to the public, industry and at the time of real estate sales. The Strategies for the Enhanced On-site Sewage System Operation & Maintenance Objectives are located under 1.1 and 2.1 in the Strategic Plan.

Education/Outreach

Program Gaps

Up until 2005, there was no coordinated outreach initiative targeted to citizens by the three local agencies. General knowledge and awareness were needed within the community to establish a water quality stewardship ethic and to generate support for shellfish programs. In addition, specific and focused educational programs are needed for streamside and shoreline property owners.

One component of increasing the awareness of water quality issues in the shellfish areas is to educate the community on the importance of septic system care and maintenance. Building community relationships and support to encourage this behavior will be important and a part of current septic education. To increase positive behavior changes we will be focusing on incentives, workshops, educational materials and strong marketing techniques.

Progress and Status

SWM, the Health Department, PCD, Pierce Stream Team, Harbor WildWatch, and Citizens for a Healthy Bay all currently provide education and outreach services. (Citizens for a Healthy Bay provides boater and angler education.)

Strategic Plan Response

Streamside and shoreline property owners need to be targeted for programs that will result in actual behavioral changes since these are the people who must implement best management practices in order to successfully reduce the fecal coliform load to the stream or bay. A reduction in fecal coliform

concentrations may be achievable by targeted outreach to streamside and shoreline property owners. It should be noted that these programs should have the backing of technical assistance, financial assistance, and enforcement efforts to support the implementation of on-the-ground changes in order to be effective.

The Strategic Plan emphasizes moving forward in education and outreach through the implementation of a Communication and Education Plan which will include an enhanced education and outreach component. Strategies to enhance education and outreach in the shellfish areas will include technical assistance, informational workshops and an effort to build a stewardship ethic among the community. Educating the professional sector to bridge communication gaps and formalize common messages and community awareness of water quality issues will also be a strategy integrated into the education and outreach process. The Strategies for the Education/ Outreach Objective are addressed in the Strategic Plan under 1.2 and 2.2 called “Implement Enhanced Education/ Outreach”.

Effective Communication

Program Gaps

Effective communication among partners as well as the public is a critical area which provides a foundation to achieve formal and informal coordination on shellfish issues. Currently, the Health Department facilitates quarterly meetings of the Burley and Filucy Bay Water Quality Team. In part these meetings accomplish the sharing of information and resources between partners. They are typically attended by the Health Department, SWM, PCD, Ecology, DOH, and local shellfish growers as well as the public. Although these meetings are very effective, more consistent ways of documenting issues and sharing information in a more timely fashion is needed including informing the public.

DOH routinely gathers and reports large amounts of fecal coliform data and keeps records of sanitary surveys that it conducts. Pierce County gathers more limited amounts of fecal coliform data, keeps records of sanitary surveys, and maintains files on individual cases where problems were identified and documents the efforts made to solve them. Data gathered by the Health Department in the course of its on-site sewage system investigations is maintained in the department’s own files. Data obtained by the Stream Team is maintained by PCD and shared with SWM. Both the Health Department and SWM link their water quality data to a GIS layer in County View which is Pierce County’s GIS system.

There is no central database available to all three local agencies. This gap should include the initial cost of data management system development and the on-going cost of maintenance and quality control. Existing data management systems should be inventoried to see if they can be effectively utilized by all local agencies with minimal modifications.

Progress and Status

SWM, the Health Department, and PCD have staff assigned to support general coordination activities.

SWM believes their data management needs are mostly being met, but there remains a need for a shared database. SWM sees an additional ongoing need to support maintenance of a web-based system for sharing information and water quality data with other Partners and the public.

Strategic Plan Response

A shared comprehensive database was determined to be a key element to accomplish effective communication between partners. Other factors included in this objective are information sharing among partners which includes databases, work plans as well as a joint referral process. Consistency of procedures along with the coordination of emergency response procedures and training among staff across partner organizations was also found to be crucial. Lastly, the identification and outreach to all necessary partners will be accomplished within this objective as well as better ways of informing the public. The Strategies for the Effective Communication Objective are addressed in 1.5, 2.4 and 3.4 in the Strategic Plan.

Inspection/Monitoring/Sampling

Program Gap

The purpose of bacteriological monitoring by DOH is to check that shellfish harvesting areas are accurately classified and to provide a warning when the quality of waters in shellfish harvesting areas is deteriorating. DOH collects marine water samples from several locations within shellfish growing areas. DOH's monitoring effectively serves its purpose, but does not provide a sufficient informational basis for identifying sources of pollution. The Health Department and SWM both have sampling programs, some of which coincide with the timing of DOH's monthly marine sampling. Also, both the Health Department and SWM perform investigative sampling in response to suspect activities or poor sampling results, so these issues are no longer perceived to be program gaps. Where greater coordination and capacity are needed is on streams where the drainage crosses a jurisdictional boundary. The Minter, Burley, and Rocky Bay drainages are shared between Pierce and Kitsap County, so investigative monitoring cannot be performed by a single agency and must be coordinated.

Additional monitoring gaps exist in two areas, volunteer monitoring and beach monitoring. Stream Team needs additional resources to manage and train volunteers, particularly property owners who implement BMPs. Training property owners would build greater stewardship on their part for their streams and collect data on the impacts of BMP installation. Beach monitoring is needed to accurately assess beach health and to identify trends. At this time, scientific protocols for beach monitoring are available but systematic sampling of area beaches has not occurred.

When a shellfish harvesting area is threatened with being downgraded, due to increasing fecal coliform counts, the Health Department intensifies the inspection of the shoreline in the area to identify the source(s). Sources of fecal coliform bacteria that might contaminate shellfish beds are identified through the course of inspections, sanitary surveys and water quality monitoring by DOH, the Health Department, SWM and PCD. Potential sources may also be identified by visual inspection of the shoreline and shoreline properties.

The methods used to identify sources are adequate in most cases but the process used to identify sources could be made more effective if there was a more coordinated and focused response to downgrades or threatened downgrades.

Progress and Status

The Health Department has staff assigned to this activity. PCD has staff assigned to maintaining their Farm Inventory. Kitsap Public Health District needs more resources to fully support monitoring and sampling in their areas of the KGI Watershed. To adequately address increased monitoring to prevent a downgrade, SWM, PCD, and Pierce Stream Team would all need additional resources.

Strategic Plan Response

Although the Pierce County Shellfish Partners currently have well developed inspection, monitoring, and sampling programs, additional refinement is needed to better identify fecal coliform sources. The strategic plan calls for improvements in the response to high bacteria counts detected in DOH's sampling, refinements to the Health Department's shoreline evaluation, upland, and special investigation sampling, and additional inspections. The Strategies for the Inspection/Monitoring/Sampling Objective are addressed in the Strategic Plan under 2.3.

Pollution Correction Facilitation and Enforcement

Program Gap

Pollution correction activities are currently conducted by a number of the Pierce County Shellfish Partners. The Health Department's Septic Repair Facilitator assumes the lead role in facilitating septic system repairs and prompting the correction of animal keeping practices that are adversely impacting water quality in the Pierce County portion of the shellfish watersheds. SWM assumes the lead role for stormwater correction activities and can take enforcement under the Illicit Discharge Ordinance. PCD provides technical assistance to farms to install and implement BMPs to improve water quality. Ecology provides enforcement when farmers impacting water quality chose not to work with PCD.

When the Health Department locates a suspected fecal coliform source water sampling is conducted to determine whether a violation is occurring. If the source is suspected to be an on-site sewage system, the Health Department may employ dye-testing to verify the failure. The Health Department's Septic Repair Facilitator is involved in this process and, if the system is found to be failing, offers technical assistance to the property owner to help identify the cause of the failure and facilitate the repair. If the property owner declines assistance and refuses to repair the system, the site is referred to the Health Department Compliance Program for further action.

If improper livestock management is the source, the Health Department will send a letter to the property owner, notifying them of the problem, and asking them to work with PCD. PCD will work with the property owner to identify, recommend, design, and install needed BMPs. If the property owner chooses not to work with PCD or correct the problem themselves, the Health Department refers the site to Ecology for further action.

SWM samples stormwater outfalls, pipes, and ditches through their Illicit Discharge Detection and Elimination (IDDE) program to identify illicit discharges to county-owned facilities. SWM also inspects private stormwater detention ponds and requires the responsible party to make any needed corrections.

Citizens for a Healthy Bay works to address waste disposal from recreational boaters but has no regulatory authority.

Program gaps for technical assistance programs occur in part because property owners are not aware of the programs. Many property owners may not want to contact an agency for technical assistance due to the fear of high repair costs or fear of enforcement action. Also, there is no guarantee that the property owners at greatest risk for generating pollution will be the ones to utilize the assistance offered.

Additional program gaps exist for beneficial technical assistance programs that are not currently supported. Technical assistance for shoreline homeowners interested in removing or replacing hard armoring is also limited.

Finally, at this time there are no practice standards, BMPs, or technical assistance available to aquaculture operations. These operations are not unlike other types of agricultural activities and their potential environmental impacts vary greatly on their ability to implement and maintain good management practices.

Enforcement is not the preferred approach for addressing most water quality problems. A water quality correction achieved through an enforcement action can take significantly longer and require much higher agency costs than other methods. However, without enforcement action or a credible threat of enforcement action, some known problems may remain uncorrected for years. Pierce County SWM has achieved a 75% reduction in significant noncompliance with stormwater requirements since 2008, utilizing an intensive technical assistance program. Still, more aggressive enforcement may be necessary to achieve the high level of compliance necessary to protect shellfish harvesting waters. Successful improvements have been made to local enforcement programs by giving local agencies greater enforcement authority and by coordinating violation referrals. Addressing an egregious violation on the part of an uncooperative land owner may require support from the Pierce County Sheriff and Prosecuting Attorney. The Sheriff and Prosecuting Attorney generally place a low priority on these types of violations since they are not perceived as being as serious as other crimes. It should be clear that the primary goal of enforcement is to motivate property owners to make corrections that will result in improved water quality and to provide a disincentive for people to violate. PCD does not have enforcement capability but is able to perform inspection functions for farming operations by maintaining a farm inventory and performing site visits.

Progress and Status

Currently, the Health Department has staff assigned to pollution identification and technical assistance, and Citizens for a Healthy Bay (CHB) has staff performing on-water patrols to identify and respond to boat related pollution sources. Kitsap Public Health District has committed resources to identifying pollutant sources in the watershed. CHB would need more resources to support an ongoing on-water patrol in this area. Kitsap Public Health and KCD would also need additional resources to support a fully functioning program.

PCD's current program provides a sufficient level of support for a fully functioning program if aquaculture technical assistance needs are excluded. If PCD becomes the lead for providing aquaculture technical assistance, they will require additional resources, first to develop practice standards and second, to work with aquaculture operations.

SWM has added resources toward enforcement. However, SWM may not be able to continue to maintain enforcement resources in shellfish areas at the needed level if SWM's NPDES permit obligations pressure the division to direct those resources to other areas. To fully ensure adequate enforcement resources for shellfish areas, SWM would need additional IDDE staff to support an aggressive enforcement program in those areas. The Pierce County Prosecuting Attorney's Office and the Sheriff's Department do not have existing programs that are sufficiently responsive to water quality concerns so those programs would need to be added. The Health Department and Kitsap Public Health both have existing programs pursuing enforcement issues in this area.

Strategic Plan Response

The Strategic Plan addresses the need to improve pollution correction facilitation and enforcement through two primary strategies: enhanced technical assistance and enhanced enforcement. Please note that technical assistance as a strategy has been addressed throughout the plan under various other objectives as well. The strategies for Pollution Correction Facilitation and Enforcement are captured under Objective 3.1.

Owner Operator Incentives

Program Gap

Direct financial assistance to landowners has been one of the most successful approaches for getting farm BMPs constructed and septic system repairs completed. Pierce County currently has a grant and loan program to support septic system repairs that has been successful in resolving almost 50 failures. Unfortunately these funds are limited and not sufficient to support a self-sustaining program. Additional financial incentive programs that would support better septic system maintenance practices include inspection rebates, riser installation rebates, drain field maintenance rebates, and pump-out coupons.

Limited financial assistance is available to help property owners correct problems associated with septic systems, livestock, and stormwater management. When it is available, it is often for short, irregular time periods and grant dependent. Currently, cost-share funds for agricultural BMPs are available through an existing Centennial Clean Water Fund Grant and a National Estuary Programs grant. Financial assistance needs to be available in more predictable quantities at predictable time intervals. Even if funds were available, there are no existing criteria for allocating monies or a fiscal agent to track expenditures and confirm that the allocated funds have been used appropriately.

The existing assistance programs rely on property owners to submit applications for available monies. There is no guarantee that applications will be of high quality or target high priority problems. Systematically targeting high priority projects for funding is an existing program gap.

Funding for stormwater system maintenance can also be particularly problematic. Many facilities are shared by all of the property owners within a subdivision so the responsibility for maintain the system often falls to a homeowners' association. If the homeowners' association is not actively managed and collecting fees, they may have neither the leadership nor the funds needed to complete the work.

An approach which has not been utilized effectively to target pollution correction and prevent downgrades is the use of land conservation incentives. An inventory is needed of properties that would

provide the greatest potential water quality benefit if they were either protected or restored. Once completed, a program needs to be established to encourage placing those parcels in conservancy status. This could be through outright acquisition, purchasing easements, tax reduction, or transfer of development rights.

Another activity which supports downgrade prevention would be the acquisition of development rights to significant parcels. This can occur through the sale of easements, use of property tax reduction programs, voluntary title restrictions, and outright property acquisition. The Great Peninsula Land Conservancy (GPLC) received grant funding in 2012 to acquire and protect over 6 acres of tidelands in the Rocky Bay estuary. This approach was also used successfully to resolve a pollutant source in the Filucy Bay area from a small farm. To fully support a successful program in the KGI area, the Shellfish Partners would need to identify and prioritize key areas where acquisition would be an effective tool. GPLC would need staff resources to contact and work with property owners and pursue funding sources. Additionally, a budget of approximately \$200,000 per year would be needed to support acquisition actions.

Progress and Status

In 2007, SWM received \$250,000 in loan funds and \$183,000 in grant funds to initiate Pierce County's On-site Grant and Loan Program. Additional funds, in the form of \$500,000 in loan and \$250,000 in grants to continue the program were received in 2010. In 2013, SWM received an additional \$250,000 in grant only funding and is exploring options for turning loan reimbursements back into the program for future loans. However, neither fund sources are sufficient to maintain a long-term, fully functioning program. An estimated endowment of \$1.5 million would allow the program to be self-sustaining within the KGI Watershed.

An additional gap has been identified in providing cost share for agricultural BMP, stormwater system maintenance, and boat pump-out implementation projects. Funds are currently available through a Centennial Clean Water Fund Grant that expires at the end of 2013 and through an EPA grant to the Health Department through the Washington State Department of Health which will expire in December 2013. Cost share funding is needed to support agricultural BMP establishment and private stormwater facility maintenance and retrofit.

A new, permanent, and effective boat pump-out station is needed at Long Branch Marina. Washington State Parks offers grants that would cover 75% of the costs, but matching funds need to be secured.

GPLC has been working on acquisition projects in the KGI area at this time but a fully functioning acquisition program would require additional staff and an annual allotment of funds that could be used to purchase parcels or easement, and/or match grant funds that can be used toward property acquisition.

Strategic Plan Response

The strategies included under this Objective range from incentives for implementing Agriculture BMP's, septic system inspections and repairs, stormwater BMP's, boat and marina BMP's as well as land acquisition. Making the public aware of the programs and incentives is an integral part in the achievement of this objective and is specified as a Target. The strategies for the Incentives Objective are captured under "Owner/ Operator Incentives" in 1.4 and 3.3.

State and Local Regulatory Support

Program Gaps

There are two types of program gaps that are included under regulatory support, one requires changes to existing codes and another requires a greater role by Shellfish Partners in decision-making processes. A review needs to be done of current regulations for codes that encourage or allow activities that threaten water quality. Among the codes that should be reviewed are the county shoreline regulations, critical areas, zoning code, and allowable animal densities. In the review of critical area regulations it should be noted that set, mandatory buffer widths may not always provide the best protection for shellfish areas since site conditions can vary greatly.

Additionally, the Shellfish Partners need to plan for and play a stronger role in decision-making processes. This should include developing better communications with PALS, and being prepared to review and comment on permit applications and proposed legislation. A formal policy document providing guidance for activities in shellfish areas needs to be prepared and adopted. This document could then be referenced as support in SEPA decisions and mitigation measures. Shellfish Partners need to work with the Office of Emergency Management to develop disaster preparedness policies and responses for shellfish areas. Finally, the standards for the Marine Recovery Area should be implemented county-wide. The costs to implement those standards county-wide are not included in this Shellfish Partners Program.

Progress and Status

In 2007, Pierce County, Tacoma-Pierce County Health Department, and Pierce County Community Development Corporation signed an Interagency Agreement to establish, administer, fund, and collaborate on a Pierce County Grant and Loan Program for septic system repair or replacement. In 2007 and 2010, the Pierce County Council passed resolutions supporting and clarifying Pierce County's role in the Septic System Repair Grant and Loan program.

Additionally, Pierce County formally adopted the Key Peninsula-Islands Basin Plan which included this Shellfish Program proposal in 2006. Also, SWM reauthorized their stormwater illicit discharge ordinance in 2011. Finally, the Health Department, SWM, and PCD developed a referral flow chart to address potential agricultural violations. While these changes did not strictly follow the recommendations developed in 2005, SWM believes that the current authorizations and agreements support a fully functioning program.

However, Shellfish Partners members still need to review existing regulations for inconsistencies and potential conflicts with the goal of improving water quality. Also, Partners need to participate and comment when new regulatory changes are proposed.

The review of existing regulations would require additional staff for approximately six months. This task would include identifying local and state regulations for review, assigning Partners review responsibilities, collecting comments, and preparing a joint Shellfish Partners proposal recommending regulatory enhancements.

Strategic Plan Response

The Strategic Plan addresses State and Local Regulation Measures through Strategies and Actions by means of regular communication with regulatory agencies to ensure MRA targets and Shellfish Partners issues are considered during regulation creation and revision as well as land use decisions. In addition, enhancement of current regulations and anticipating future efforts will also support these efforts. The strategies for the State & Local Regulatory Support Objective are captured under Objectives 1.3 and 3.2.

Research

In this context, research describes the need to stay current with emerging issues, technology, BMPs, and communication tools. It also addresses the need for organizations to be responsive and adopt new techniques as they are developed.

Program Gaps

This is a challenging gap to characterize because its focus is on expected changes. It has two main components; remaining alert for new information and adopting new practices once they are determined to be beneficial. At this time tracking information about new techniques and practices seems to be happening reasonably well, but somewhat informally. The program might be improved by asking Partner agencies to commit to tracking certain types of information and establishing regular mechanisms for sharing the information collected.

The program gap is more pronounced when it comes to identifying and adopting new practices. Permitting agencies may not have the guidance or knowledge in place to allow the use of new techniques or the ability to evaluate the quality of their installation. Updating communication tools can be expensive, may require policy changes, and may require additional resources to maintain compatibility and provide technical support. Finally, many agencies don't have the capabilities needed to perform original research or do their own testing of new methodologies.

A significant issue with bacteriological monitoring is identifying the source of the bacteria. Microbial source tracking (MST) studies have been attempted in other parts of Puget Sound and other areas of the Country to differentiate between human and animal sources but preliminary methodologies only indicated the presence or absence of human, bird, or ruminant species without quantifying the contribution. In the few cases where the source of fecal coliform is disputed, the use of DNA analysis or ribotyping to identify the species that is the source of fecal coliform may be justified. Because DNA analysis remains expensive, it would only be justified when more conventional source identification methods have demonstrably failed. Until a reasonable quick, reliable, and affordable method arises, this will be a gap in MST technology.

Progress and Status

SWM would need to dedicate staff for 6 months to develop a comprehensive plan identifying necessary technology updates, tracking needs, training needs, and original research needs.

Strategic Plan Response

The identification of new and emerging technologies, BMP's (Best Management Practices) as well as the consideration of green technologies and climate change are all central strategies to the Research Objective in the Strategic Plan. The strategies for the Research Objective are captured under Objectives 1.6, 2.5 and 3.5.

Evaluation

Evaluation encompasses those efforts needed to measure the ongoing effectiveness of the Shellfish Partners program. It will require data collection, trend analyses, public and customer feedback, and regular comparison against identified targets.

Program Gaps

The information needed for ongoing evaluation is being collected. However, it may need to be synchronized and/or collected at more regular intervals. A baseline as well as protocols should be established so data can be compared and trends identified. Once completed, the Shellfish Partners will need to consciously compare outcome measurements against the targets identified in the Strategic Plan.

Progress and Status

SWM or the Health Department would need resources to develop a baseline, then ongoing staff support to track results and prepare and present progress reports.

Strategic Plan Response

The Strategic Plan addresses evaluation on various levels. Programmatic evaluation, Strategic Plan evaluation, trend analysis, training and community/ partner feedback are all evaluation strategies which are included in the Evaluation Objective. The strategies for the Evaluation Objective are captured under Objectives 1.7, 2.2, 2.6, and 3.6.

SUMMARY OF PROGRAM STATUS AND NEEDS

The accompanying table, "Attachment 2, Pierce County Shellfish Program", summarizes existing organizational resources committed toward water quality programs in the KGI Watershed. It also includes a specific listing of both staff and cash resources needed to support a fully functioning program and meet the goals of the strategic plan. Staff resources are described as Full Time Equivalent (FTE) resources. Currently, participating agencies have more than 10 FTEs working on water quality issues in shellfish areas. However, these agencies estimate the need to support a fully functioning shellfish program as 17.75 FTEs and over \$2 million.

REFERENCES

Carmichael, R.H., Walton, W., and Clark, H. "Bivalve-Enhanced Nitrogen Removal from Coastal Estuaries". Canadian Journal of Fisheries and Aquatic Sciences. Volume 69, Issue 7. June 2012, pp. 1131-1149.

Damery, D.T. and Allen, P.G. "An Economic Valuation of Recreational Shellfishing on Cape Cod". *University of Massachusetts Amherst* Department of Resource Economics Working Paper No. 2004-10.

Growski, J.H. and Peterson, C.H. "Restoring Oyster Reefs to Recover Ecosystem Services". [Theoretical Ecology Series](#). Ecosystem Engineers — Plants to Protists. [Volume 4](#), 2007, pp. 281–298.

Lindahl, O. et al. "Improving Marine Water Quality by Mussel Farming: A Profitable Solution for Swedish Society". AMBIO: A Journal of the Human Environment. [Royal Swedish Academy of Sciences](#). Volume 34, Issue 2. March 2005. pp 131-138.

Newell, R.I.E. and Koch, E.W. "Modeling Seagrass Density and Distribution In Response To Changes In Turbidity Stemming From Bivalve Filtration And Seagrass Sediment Stabilization". Estuaries and Coasts. Volume 27, [Issue 5](#), October 2004, pp 793-806

Attachment 2. Pierce County Shellfish Partners Budget and FTE Table						
		2012		2012 Identified GAP*		
Program Elements	Current FTEs	\$	FTE's Needed	Unmet FTE Gap	\$	Comments
Enhanced Operation & Maintenance						
TPCHD (Health Department)	1.8		3.3	1.5		
<i>Subtotal</i>	1.8		3.3	1.5		
Education and Outreach						
SWM	0.2	\$20,000	0.2			
TPCHD (Health Department)	0.25		0.25		\$10,000/yr	
PCD	0.25		0.25			
CHB	0.2		0.3	0.1		Current FTE is grant funded.
HWW	0.2		0.5	0.3		
Stream Team	0.05		0.15	0.1		
<i>Subtotal</i>	1.15		1.65	0.5	\$10,000/yr	
Effective Communication						
SWM	0.3		0.4	0.1		
TPCHD (Health Department)	0.95		0.75	-0.2		Can have slight reduction from current level, since we are now doing much program development
PCD	0.05		0.05			
<i>Subtotal</i>	1.3		1.2	-0.1		
Inspection/Monitoring/Sampling						
SWM	0.9		1.35	0.45		
TPCHD (Health Department)	2.65		2.65		\$29,000/yr lab and equipment	
PCD	0.05		0.15	0.1	\$2,000/yr soil sampling	
KPHD	0.1		0.4	0.3	\$10,000/yr lab and equipment	
Stream Team	0.1		0.2	0.1	\$1,000/yr equipment and supplies	
<i>Subtotal</i>	3.8		4.75	0.95	\$42,000/yr	
Pollution Correction Facilitation and Enforcement						
SWM	0.5		1.5	1.0		
TPCHD (Health Department)	0.8		1.05	0.25	\$7,500/yr attorney costs	

PCD (Technical Assistance only)	0.1		0.2	0.1		
PA			0.15	0.15		
KCD	0.1		0.3	0.2		
CHB	0.3		0.4	0.1	\$18,000/yr	Current FTE is grant funded.
Sheriff			0.1	0.1		
KPHD	0.4		0.4	0.1		
<i>Subtotal</i>	2.2		4.1	2.0	\$25,000/yr	
Incentives						
SWM			0.45	0.45	\$25,000/yr	
TPCHD (Health Department)			0.1	0.1	\$25,000/yr incentives	Estimated long term funding
PCD			0.1	0.1	\$30,000/yr	
CDC	0.1		0.2	0.1	\$1,500,000	
CHB/Longbranch Marina			0.2	0.2	\$50,000	One time cost associated with construction of pump- out facility.
KCD					\$20,000/yr	
GPLC	0.2		0.5	0.3	\$200,000/yr	
Washington State Parks					\$150,000	75% of pump out facility, one time cost, recreation grant fund
<i>Subtotal</i>	0.3		1.1	1.25	\$1,700,000 x1 and \$300,000/yr	
State and Local Regulatory Support						
SWM			0.5	0.5		One time cost for development
<i>Subtotal</i>			0.5	0.5		
Research						
SWM			0.5	0.5		One time cost for development
<i>Subtotal</i>			0.5	0.5		
Evaluation						
SWM			0.15	0.15		0.1 one time cost + 0.05 ongoing
TPCHD			0.1	0.1		Community Survey time
<i>Subtotal</i>			0.25	0.25		
Summary						
<i>SWM</i>	1.9	\$20,000	5.05	3.15	\$25,000/yr	
<i>TPCHD</i>	6.45		8.0	1.55	\$71,500/yr	
<i>PCD</i>	0.45		0.7	0.25	\$30,000/yr	
<i>PA</i>	0		0.15	0.15	0	

<i>Sheriff's Office</i>	0		0.1	0.1	0	
<i>CHB</i>	0.5		0.9	0.4	\$50,000 one-time and \$18,000/yr	
<i>HWW</i>	0.2		0.5	0.3	0	
<i>KPHD</i>	0.2		0.9	0.7	\$10,000/yr	
<i>KCD</i>	0.1		0.3	0.2	\$20,000/yr	
<i>Stream Team</i>	0.15		0.25	0.1	0	
<i>GPLC</i>	0.3		0.7	0.4	\$200,000/yr	
<i>CDC</i>	0.1		0.2	0.1	\$1,500,000 one-time	
<i>Washington State Parks</i>	0		0	0	\$150,000 one-time	
<i>TOTAL</i>	10.35	\$20,000	17.75	7.4	\$2,074,500	One-time + 1 year ongoing costs

Notes:

- 1. The dollar amounts (\$) in the Summary section include both single year program estimates AND lump sum estimates.
- 2. Some of the FTEs included in the existing 2012 calculations are temporary, grant funded positions.
- 3. The lump sum of \$1.5 million to support the CDC’s on-site grant and loan program is the estimated level of support needed for the KGI Watershed only. It is estimated that \$3 million would be needed to establish a self-sustaining program Pierce County-wide.

ACRONYMS	
SWM	Pierce County Public Works and Utilities, Surface Water Management Division
TPCHD	Tacoma-Pierce County Health Department
PCD	Pierce Conservation District
PA	Pierce County Prosecuting Attorney
Sheriff's Office	Pierce County Sheriff
CHB	Citizens for a Healthy Bay
HWW	Harbor WildWatch
KPHD	Kitsap Public Health District
KCD	Kitsap Conservation District
Stream Team	Pierce Stream Team
GPLT	Great Peninsula Land Trust
CDC	Pierce County Community Connections

*This is the identified gap that needs to be addressed to meet the 2017 and 2020 targets in the Strategic Plan.